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UNITED STATES DISTRICT COURT
DISTRICT OF NEW JERSEY

RAJESH KUMAR, Plaintiff, – v. – THE INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC., Defendant.	:	Case No. 2:12-cv-06870-KSH-CLW **DEFENDANT'S RESPONSE TO PLAINTIFF'S LOCAL CIVIL RULE 56.1 STATEMENT OF MATERIAL FACTS NOT IN DISPUTE** Motion Date: April 20, 2015

Defendant The Institute of Electrical and Electronics Engineers, Incorporated ("IEEE"), as and for its Response to Plaintiff's Local Civil Rule 56.1 Statement of Material Facts Not in Dispute submitted in connection with his motion for summary judgment under Fed. R. Civ. P. 56, to which IEEE's Statement of Additional Material Facts Not in Dispute is appended, hereby asserts as follows:

DEFENDANT'S RESPONSE TO
PLAINTIFF'S MATERIAL, UNDISPUTED FACTS

1. Plaintiff Kumar is a computer scientist whose work has focused on medical robotics, computer-assisted surgery and other human-machine interactions. Declaration of Dr. Rajesh Kumar ("Kumar Decl.") ¶ 3 & Ex. B.

Defendant's Response: Admitted.

2. Dr. Kumar has worked in academia and private industry, including in a senior position at Intuitive Surgical, Inc., where he developed the prototype that led to the da Vinci Si robotic surgery platform. Kumar Decl. ¶ 3 & Ex. B.

Defendant's Response: Admitted.

3. Dr. Kumar has published over 100 patents and applications, books, chapters, articles and peer-reviewed conference papers. Kumar Decl. ¶ 3 & Ex. B pp. 2-12.

Defendant's Response: Admitted.

4. Dr. Kumar has served as a conference organizer and article reviewer for Defendant IEEE. Kumar Decl. Ex. B at 1-2.

Defendant's Response: Admitted in part and denied in part. IEEE admits that Plaintiff Rajesh Kumar ("Kumar") has reviewed articles for IEEE but denies that Kumar has served as a conference organizer for IEEE. Kumar Dec., Exh. B at 1-2.

5. IEEE editors continued to solicit Dr. Kumar's expertise for peer review even after this lawsuit was filed. Kumar Decl. Ex. C.

Defendant's Response: Admitted.

6. Dr. Kumar began his Ph.D. research as a graduate student in computer science at Johns Hopkins University ("JHU") in 1996. There, he researched and developed new software architectures for computer-assisted surgery, focusing on systems in which humans and robots perform surgical and other tasks cooperatively. He worked primarily with JHU's "steady hand robot," a modular test bed that he helped develop and for which he wrote all of the robot control application programming interface software needed during his graduate student tenure. The steady hand robot allows a user to manipulate a tool jointly with the machine, in a manner that reduces human tremor and enables extreme precision. Kumar Decl. ¶ 5.

Defendant's Response: Admitted in part and denied in part. IEEE admits the allegations contained in the first, second and fourth sentences in this Paragraph. With respect to the third sentence contained in this paragraph, Kumar was among many scientists and researchers who worked on the "steady hand" robot, which was conceived independently of him. *See* the Moving Declaration of Russell Taylor ("Taylor Dec.") [Dkt. 73], ¶¶ 2-3, Exhs. A and B. The implication that Kumar was somehow a creator or primary author of the steady hand robot is therefore denied.

7. Dr. Kumar's Ph.D. dissertation ("Thesis"), published in 2001, is entitled "An Augmented Steady Hand System for Precise Micromanipulation." The Thesis is based on his five-plus years of research at JHU. Kumar Decl. ¶¶ 2, 6, Ex. A.

Defendant's Response: Admitted.

8. Dr. Kumar led and was personally responsible for the work described in the Thesis, which was funded in part with National Science Foundation grants. Kumar Decl. ¶ 6.

Defendant's Response: Admitted in part and denied in part. IEEE admits that the Thesis describes some work for which Kumar was personally responsible that was funded in part with National Science Foundation grants. However, as the Thesis makes clear, other work it describes was performed by other scientists, on whose research Kumar built. *See, e.g.,* Kumar Dec., Exh. A at RK-IEEE000268-75; Opposition Declaration of Bruce R. Ewing ("Ewing Opp. Dec."), Exh. A (Taylor Tr.) at 190-91, 195.

9. The Thesis is Dr. Kumar's original solution to a complex computing problem: how to generate simple, modular programming instructions ("primitives") that can be combined and transparently implemented to control the steady hand robot in order to execute complex, microscopic tasks in coordination with a human operator. The Thesis explains how to use "task modeling" to improve control of the steady hand robot, thereby enhancing its potential future use in microsurgery and other tasks requiring both extreme precision and human decision-making. Kumar Decl. ¶ 7 & Ex. A.

Defendant's Response: Admitted in part and denied in part. IEEE admits that the Thesis as a whole contains original material contributed by Kumar, but denies that the concept of using "task modeling" to operate a robot, or to program a robot by using modular programming instructions known as primitives, are such original contributions. *See* Ewing Opp. Dec., Exh. A (Taylor Tr.) at 39-41, 190-91, 195; *see also* Defendant's Local Civil Rule 56.1 Statement of Material Facts Not in Dispute ("IEEE 56.1 Statement") [Dkt. 74], ¶¶ 19-23, 34-42.

10. Dr. Kumar's Thesis used visualizations, called "task graphs," to both visualize the complex tasks and to help implement the corresponding computer code that instructs the robot to perform complex motions – some human-initiated, some machine-initiated. The task graphs decompose complex tasks into a series of more basic modules, each signifying a particular set of coding instructions. Kumar Decl. ¶ 7 & Ex. A at 38; Expert Declaration of J. Kenneth Salisbury Jr. ("Salisbury Decl.") ¶ 15.

Defendant's Response: Admitted.

11. The Thesis provides several example scenarios for implementing and testing Dr. Kumar's task graph programming. One such experiment is based on "retinal vein cannulation" ("RVC"), a microsurgical technique that involves insertion of a micropipette (a minuscule tube) into a blood vessel in the retina in order to inject medicine. Kumar Decl. ¶ 8 & Ex. A at 51-77.

Defendant's Response: Admitted.

12. Dr. Kumar had practical reasons for choosing RVC as an experimental example. Porcine eyes were readily available for research purposes, and a small business had donated the necessary needles, thus providing a non-clinical setting in which Dr. Kumar could perform the numerous trials needed to test the feasibility and effectiveness of his code. Kumar Decl. ¶ 8 & Ex. A at 69-75, 81.

Defendant's Response: Admitted in part and denied in part. IEEE denies the allegations contained in this paragraph to the extent Kumar contends that his use of the retinal vein cannulation surgical procedure as an example in his Thesis was due to practical considerations. In fact, the scientists at Johns Hopkins University ("JHU") who developed the steady hand robot made the retinal vein cannulation procedure a focus of their research, making it a natural area of study for Kumar and others at JHU. Taylor Dec., ¶¶ 2-3, Exh. A at IEEE_001560-61, Exh. B at

pages C-12-C-13; Ewing Opp. Dec., Exh. A (Taylor Tr.) at 96-97; Exh. B (Hager Tr.) at 25-27, 78-82, 195-200.

13. As part of his Thesis work, Dr. Kumar used the robot to pierce the porcine vessels with a micropipette, both with and without his task-level augmentation code. The experiments confirmed the feasibility of Dr. Kumar's task graph program in a realistic surgical workspace. Kumar Decl. Ex. A at 72, 75.

Defendant's Response: Admitted in part and denied in part. IEEE admits the allegations contained in the first sentence of this paragraph. IEEE denies the allegations contained in the second sentence of this paragraph, as the experiments described in the Thesis were not performed on human eyes, and the Thesis makes clear that further research would be needed. Kumar Dec., Exh. A at RK-IEEE000331-34.

14. RVC has never been clinically performed on humans with steady-hand robotic assistance. Kumar Decl. ¶ 9; Declaration of Eric M. Stahl ("Stahl Decl.") Ex. N, 64:2-65:15.

Defendant's Response: Admitted.

15. The Thesis is not about RVC, but simply uses RVC as an illustration of one of the experiments Dr. Kumar devised to test his code. Kumar Decl. ¶ 9.

Defendant's Response: Admitted.

16. Thesis Figure 5.13 consists of a task graph representation of Dr. Kumar's RVC experiment. Kumar Decl. ¶ 10 & Ex. A at 70-72, Fig. 5.13.

Defendant's Response: Admitted.

17. Thesis Figure 5.13 does not describe the steps necessary to actually perform RVC; rather, it decomposes the surgical process into individual, programmable tasks, at a level of abstraction that Dr. Kumar determined to be appropriate for performing his experiment. Kumar Decl. ¶ 10; Salisbury Decl. ¶¶ 16-21.

Defendant's Response: Admitted in part and denied in part. IEEE denies that Figure 5.13 describes anything. Rather, the Figure lists visually the steps involved when the retinal vein cannulation surgical procedure is performed by the steady hand robot, which was an active area of research at JHU at the time the Thesis was drafted. Taylor Dec., ¶¶ 2-3, Exh. A at IEEE_001560-61, Exh. B at on pages C-12-C-13; Ewing Opp. Dec., Exh. B (Hager Tr.) at 42-45, 209-16. In addition, the "level of abstraction" reflected in Figure 5.13 is not attributable to any creative selections made by Kumar, but is an artifact of the manner in which the retinal vein cannulation procedure is performed with the aid of the steady hand robot. *See* the Moving Declaration of Bruce R. Ewing ("Ewing Mov. Dec.") [Dkt. 73], Exh. U (Kumar Tr.) at 55-57, Exh. V (Taylor Tr.) at 87-88, Exh. W (Hager Tr.) at 66-67; *see* the Moving Declaration of Thomas R. Friberg ("Friberg Dec.") [Dkt. 73], Exh. A at pp. 2-3.

18. Each state (e.g., "MoveToPort," "Orient," "Insert,") and each transition (e.g., "button1") in Thesis Figure 5.13 signifies substantial code that Dr. Kumar created for this RVC experiment. Kumar Decl. ¶ 11.

Defendant's Response: Admitted.

19. A task graph depicting RVC as an actual surgical procedure (rather than a technological demonstration) would not describe "orient" and insert" as separate steps. Kumar Decl. ¶ 10.

Defendant's Response: Admitted in part and denied in part. IEEE denies the allegations contained in this paragraph to the extent it concerns a task graph depicting the retinal vein cannulation procedure as performed by the steady hand robot. Any task graph showing the steps the steady hand robot would go through in performing the retinal vein cannulation procedure would include "Orient" and "Insert" steps. Ewing Mov. Dec., Exh. U (Kumar Tr.) at 55-57, Exh. V (Taylor Tr.) at 87-88; Exh. W (Hager Tr.) at 66-67; Friberg Dec., Exh. A at pp. 2-3.

20. A task graph depicting RVC as an actual surgical procedure (rather than a technological demonstration) would have included additional tasks and additional detail, such as a task for delivering medication into the retinal vessel or a "tracking" task, neither of which are depicted in Thesis Figure 5.13. Kumar Decl. ¶ 11 & Ex. A at 70, 76-77; Stahl Decl. Ex. B 118:10-119:12; Ex. N 74:4-13.

Defendant's Response: Admitted in part and denied in part. IEEE admits that, when retinal vein cannulation is performed as an actual surgical procedure, medication would typically be delivered through the cannula. IEEE denies that, when retinal vein cannulation is performed as an actual surgical procedure without the steady hand robot, a "tracking" task must be employed, as the Thesis discusses that concept only as a possibility when the procedure is performed with the aid of the steady hand robot. Kumar Dec., Exh. A at RK-IEEE000335.

21. Thesis Figure 5.13 is original to Dr. Kumar. He created it to reflect his Thesis RVC experiment as it was coded., and he conceived the individual steps shown therein, their sequence, and their text descriptions. While the task graph reflects Dr. Kumar's general understanding of RVC (based on clinical ophthalmology videos depicting the procedure), it is not based on any pre-existing work. Kumar Decl. ¶ 11 & Ex. A at 70-71; Salisbury Decl. ¶ 14-19.

Defendant's Response: Denied. Figure 5.13 of the Thesis shows the steps necessary to perform retinal vein cannulation with the aid of the steady hand robot that are dictated by the nature of the procedure, in the sequence in which they must be performed when performed by that robot. Ewing Mov. Dec., Exh. U (Kumar Tr.) at 55-57, Exh. V (Taylor Tr.) at 87-88, Exh. W (Hager Tr.) at 66-67, 209-16; Friberg Dec., Exh. A at pp. 2-3; *see* the accompanying Declaration of Blake Hannaford, Ph.D. ("Hannaford Dec."), ¶¶ 11-19; *see also* IEEE 56.1 Statement, ¶¶ 20-39.

22. The Thesis satisfied JHU Computer Science Department's Ph.D. requirements, which require a doctoral dissertation to be a "large, careful, and substantive piece [of] ***original*** work." Stahl Decl. Ex. R at 8 (emphasis added); *id.* Ex. P 23:5-16; 36:9-19; Ex. Q 20:13-27:19.

Defendant's Response: Admitted. The JHU Ph.D. requirements specify that the Thesis as a whole must be original, not all of its constituent elements. Ewing Opp. Dec., Exh. A (Taylor Tr.) at 190-91.

23. The Thesis' original work includes its use of task graphs to instruct the robot to perform complex micromanipulation tasks. Stahl Decl. Ex. Q 65:7-66:13, 84:7-21; Ex. P 34:20-35:20; Kumar Decl. Ex. A at 19-20, 36; Salisbury Decl. ¶ 23.

Defendant's Response: Denied. The use of task graphs to identify the steps performed by a robot undertaking a complex procedure like retinal vein cannulation pre-dates the Thesis. *See* Hannaford Dec., ¶¶ 11-19, Exhs. B-E; IEEE 56.1 Statement, ¶¶ 34-42.

24. The Thesis was registered with the U.S. Copyright Office in 2001, the same year it was published. Kumar Decl. Ex. D.

Defendant's Response: Admitted.

25. Dr. Kumar is the registered author and sole copyright claimant of the Thesis. Kumar Decl. Ex. D.

Defendant's Response: Admitted.

26. Dr. Kumar left JHU for private industry in 2001. Kumar Decl. ¶ 14.

Defendant's Response: Admitted.

27. In late 2002, Dr. Greg Hager of JHU's Computer Science department (one of the faculty readers who approved the Thesis) invited Danica Kragic to visit JHU as a post-doctoral researcher to work on human-machine micromanipulation. Stahl Decl. Ex. B 30:12-33:22; Ex. C.

Defendant's Response: Admitted.

28. During her visit, Dr. Kragic and Dr. Hager submitted the accused article in this case, "Task Modeling and Specification for Modular Sensory Based Human-Machine Cooperative Systems," which IEEE published in 2003 (the "IEEE Article"). Stahl Decl. Ex. A (Article); Ex. T 22:24-23:10.

Defendant's Response: Admitted.

29. [redacted]

Defendant's Response: [redacted]. *See* Ewing Mov. Dec., Exh. I; Ewing Opp. Dec., Exh. C at RK-IEEE000208, 212-13, 217.

30. [redacted]

Defendant's Response: [redacted]; *see also* Defendant's Statement of Additional, Material Undisputed Facts ("IEEE Additional Facts"), ¶ 1, *infra*.

31. Before coming to JHU, Dr. Kragic admitted to Dr. Hager that "I can't really say that my experience in this field is great[.]" Stahl Decl. Ex. D; [redacted].

Defendant's Response: Admitted. [redacted]

[redacted]

32. Prior to Dr. Kragic's arrival at JHU, Dr. Hager sent her a series of papers describing work done at the steady hand lab, including one of Dr. Kumar's unpublished manuscripts that summarizes the Thesis experiments and contains a version of Dr. Kumar's task graph depicting the decomposition of RVC. Stahl Decl. [redacted]; Ex. E, p.6 & figure 8; Ex. F; Kumar Decl. ¶ 13.

Defendant's Response: Admitted in part and denied in part. The unpublished manuscript in question, which Hager co-authored with Kumar and Dr. Russell Taylor and sent to Kragic, covers some of the same subjects and research as the Thesis, and includes a task graph depicting the retinal vein cannulation procedure that is more similar to Figure 5.13 of the Thesis than Figure 1 of the Article at issue in this proceeding. *Compare* Kumar Dec., Exh. A at RK-IEEE000329 *with* Stahl Dec., Exh. E at pg. 6. However, IEEE denies that this unpublished manuscript "summarizes the Thesis experiments"; indeed, the Thesis is only cited once in passing in this unpublished article, and not at all in connection with any of the experiments it discusses. Stahl Dec., Exh. E at pg. 2, Ref. [45].

33. [redacted]

Defendant's Response: Admitted.

34. [redacted]

Defendant's Response: Admitted.

35. [redacted] Ex. G.

Defendant's Response: Admitted. [redacted] And, Hager authored certain sections of the Article. Ewing Opp. Dec., Exh. B (Hager Tr.) at 87-95; [redacted].

36. The IEEE Article, like the Thesis, describes the use of task graphs to encode and control the steady hand robot in "human-machine cooperative systems," which combine human decision-making with robotic enhancements to perform complex tasks. Stahl Decl. Ex. A (Abstract); Kumar Decl. Ex. A.

Defendant's Response: Admitted. The use of task graphs to identify the steps performed by a robot undertaking a complex procedure like retinal vein cannulation pre-dates the Thesis. *See* IEEE 56.1 Statement, ¶¶ 34-42. Also, the Article and the Thesis do far more than discuss the use of task graphs to encode

and control the steady hand robot in "human-machine cooperative systems," which is a concept described in those words only in the Article. *Compare* Stahl Dec., Exh. A *with* Kumar Dec., Exh. A.

37. The IEEE Article describes the same strategy as is described in the Thesis for programming higher level tasks using graphically depicted coding primitives. Stahl Decl. Ex. A (IEEE Article) § 2. Kumar Decl. Ex. A.

Defendant's Response: IEEE is not clear what is meant by the term "strategy" as used in this Paragraph. If "strategy" is meant to refer to the representation of task sequences in the form of a task graph including states and transitions, then IEEE admits the allegations contained in this Paragraph but asserts that such a "strategy" is not original to Kumar. Hannaford Dec., ¶¶ 11-19, Exhs. B-E. However, if "strategy" is meant to refer to the series of steps that are undertaken when the retinal vein cannulation procedure is performed with the aid of the steady hand robot, then IEEE denies the allegations contained in this Paragraph, as the "strategies" depicted in the Article and the Thesis differ in this regard. *See* Hannaford Dec., ¶¶ 20-29; IEEE Additional Facts, ¶ 3, *infra.*

38. Like the Thesis, the IEEE Article illustrates this strategy and coding using RVC as an example, and contains a task graph containing the same (non-clinical) task decomposition of RVC as is seen in the Thesis. Stahl Decl. Ex. A. § III, VIII; Figure 1; Kumar Decl. Ex. A.

Defendant's Response: Denied. *See* Ewing Opp. Dec., Exh. B (Hager Tr.) at 229-30; Hannaford Dec., ¶¶ 20-29; IEEE Additional Facts, ¶ 3, *infra.*

39. The authors of the IEEE Article had no particular reason to choose RVC as an illustration. The IEEE Article contains no RVC-related experiment, no trials and no results. Stahl Decl. Ex. A.

Defendant's Response: Denied. Retinal vein cannulation was a subject of active, ongoing research involving the steady hand robot at the time the Article was written. *See* Response to Paragraph 12, *supra*; IEEE 56.1 Statement, ¶¶ 22-24.

40. The IEEE Article contains an expression of the RVC task graph [redacted]. It is effectively the same as that described in Dr. Kumar's Thesis, simply translated into a different computer language (XML). Stahl Decl. [redacted]; *id.* Ex. A, Section VIII; Kumar Decl. ¶ 16; Salisbury Decl. ¶¶ 32, 33.

Defendant's Response: Admitted in part and denied in part. [redacted] The second sentence of this Paragraph is denied. *See* Ewing Opp. Dec., Exh. B (Hager Tr.) at 229-30; Hannaford Dec., ¶¶ 20-29; Stahl Dec., [redacted]; Exh. X at RK-IEEE000861; IEEE Additional Facts, ¶ 3, *infra.*

41. XML is a "markup language," like HTML. It enables a user to program by "stating what the results should be," in contrast to Dr. Kumar's language, which contains the actual step-by-step instructions or "recipe" to achieve the results. Stahl Decl. Ex. N 114:19-117:3.

Defendant's Response: Admitted.

42. Dr. Kragic claims she prepared the IEEE Article's RVC task graph using the same software program (Xfig) that Dr. Kumar used to draw Thesis Fig. 5.13. Kumar Decl. ¶ 21; Stahl Decl. ¶ 9 & Ex. H p. 2; *id.* [redacted].

Defendant's Response: Admitted.

43. A side-by-side comparison of the coding in Dr. Kragic's Xfig source file for Article Fig. 1 and that in the Xfig source file for Dr. Kumar's figure 5.13 shows that Kumar's work was the original source for the IEEE Article's task graph. Each element of Dr. Kragic's task graph was created in the same sequence and same manner of construction as Dr. Kumar's original, with the same document settings, formatting and stylistic elements (except that the IEEE Article version rotates the orientation from "portrait" to "landscape"). Kumar Decl. ¶¶ 21-27 & Exs. I-K.

Defendant's Response: Denied. *See* Hannaford Dec., ¶¶ 30-35, Exh. F.

44. Each of the two task graphs at issue involved entering into Xfig hundreds of individual elements – i.e., shapes, text and formatting. They would not have appeared in the same order, with the same formatting and construction choices, unless the figures came from the same source. Kumar Decl. ¶¶ 21-27; Exs. I –K.

Defendant's Response: Denied. *See* Hannaford Dec., ¶¶ 30-35, Exh. F.

45. Dr. Kumar's Xfig source file was stored on a shared JHU network drive, and would have been accessible to anyone with administrative access to that shared network. Kumar Decl. ¶ 22.

Defendant's Response: Admitted. [redacted], and there is no evidence that either Kragic or Hager had administrative access to the network on which they were stored.

46. The IEEE Article offers no insight into task-level programming of cooperative human-robot systems that is not also contained in the Thesis. Salisbury Decl. ¶ 31.

Defendant's Response: Denied. *See* Ewing Opp. Dec., Exh. A (Taylor Tr.) at 112-13, 115-17; Hannaford Dec., ¶¶ 20-29.

47. [redacted].

Defendant's Response: Admitted. IEEE objects to the admissibility of this factual assertion and the evidence upon which it is based, as the quality of the parties' works has no bearing on the issue of infringement. *See* Fed. R. Evid. 401.

48. [redacted].

Defendant's Response: Admitted in part and denied in part. [redacted].

49. [redacted] Stahl Decl. Ex. A (Abstract and Conclusion); Ex. P 69:16-75:13.

Defendant's Response: Admitted. [redacted].

[redacted]

50. [redacted]

Defendant's Response: Admitted. [redacted]

51. [redacted] were derived from Kumar's work (Kumar Decl. ¶¶ 22-27 & Exs. I-K); [redacted]. The record contains no evidence the article authors actually developed any software that ever ran on the steady hand robot.

Defendant's Response: Admitted in part and denied in part. [redacted]

[redacted];

Hannaford Dec., ¶¶ 30-35.

52. Dr. Hager had access to the Thesis as one of Dr. Kumar's secondary advisors. Stahl Decl. Ex. P 23:5-16; 36:9-19.

Defendant's Response: Admitted.

53. The IEEE Article's bibliography cites the Thesis as a source. Stahl Decl. Ex. A (Reference [6]).

Defendant's Response: Admitted.

54. [redacted].

Defendant's Response: Admitted.

55. The IEEE Article transposes the citation to the Thesis with a reference to an unrelated work, in a way that falsely attributes to the Thesis assertions it does not make and that obscures the extent of the overlap between the two works. Stahl Decl. Ex. A; *id.* [redacted]; *id.* Ex. P 100:9-19; Kumar Decl. ¶ 17.

Defendant's Response: Admitted, although, as conceded in Paragraph 56, *infra*, IEEE published a correction in December 2012 that remedied this error. The transposition of these two references and IEEE's subsequent correction of the error are irrelevant to Kumar's claim of copyright infringement, and IEEE objects to the

discussion in Paragraph 55 herein on that basis. *See Wolfe v. United Artists Corp.*, 583 F. Supp. 52, 55-56 (E.D. Pa. 1983) (copyright infringement claims are limited to violations of the bundle of rights identified in 17 U.S.C. §§ 106, 501, in which a failure to credit or misattribution are not mentioned); *Tangorre v. Mako's, Inc.*, No. 01 Civ. 4430 (BSJ)(DF), 2003 WL 470577, at *8 (S.D.N.Y. Jan. 6, 2003).

56. IEEE agreed to correct the transposed citations in December 2012, after this litigation began, and more than nine months after Dr. Kumar brought the error to IEEE's attention. Stahl Decl. Ex. AA; Ex. Y 29:10-16; 31:18-33:10; Kumar Decl. ¶ 17.

Defendant's Response: Admitted. The correction was added in December 2012, after the initial review of Kumar's plagiarism complaint and his subsequent appeal were completed in December 2012. *See* the accompanying Opposition Declaration of Anthony Vengraitis ("Vengraitis Dec."), ¶¶ 6-7.

57. Before drafting the IEEE Article, Dr. Kragic reviewed an unpublished manuscript that Dr. Hager had provided her, containing an early version of Dr. Kumar's RVC task graph. Stahl Decl. [redacted]; *id.* Ex. E, Figure 8; *id.* Ex. F; Kumar Decl. ¶ 13.

Defendant's Response: Admitted. The unpublished manuscript lists Hager as a co-author, with Kumar. Stahl Dec., Exh. E; *see also* Response to Paragraph 32, *supra*.

58. [redacted].

Defendant's Response: Denied. [redacted]. The question was therefore objectionable. [redacted].

59. The IEEE Article mirrors the overall form, content, organization and conclusions of the Thesis, albeit in abridged form. Salisbury Decl. ¶ 26.

Defendant's Response: Denied. *See* Ewing Opp. Dec., Exh. B (Hager Tr.) at 225-30; Hannaford Dec., ¶¶ 20-29; IEEE Additional Facts, ¶ 3, *infra*.

60. The IEEE Article use almost identical language to the Thesis to describe the task-level breakdown necessary to control a robotic tool to assist in the RVC experiment. Stahl Decl. Ex. A, Section III, VIII; Kumar Decl. Ex. A, 18, 71-72.

Defendant's Response: Denied. *See* Ewing Opp. Dec., Exh. A (Taylor Tr.) at 115-17, 122-25; Exh. B (Hager Tr.) at 225-30; Hannaford Dec., ¶¶ 20-29; IEEE Additional Facts, ¶ 3, *infra*.

61. The IEEE Article attributes its description of the RVC steps solely to an article about RVC in the clinical journal *Ophthalmology* – but that source does not contains any language remotely resembling the task decomposition

or language used in the IEEE Article. Stahl Decl. Ex. A (citation [7]); Ex. O; Ex. N 89:19-90:7.

Defendant's Response: Denied. Reference [7] in the Article, entitled "Injection of Tissue Plasminogen Activator into a Branch Retinal Vein in Eyes with Central Retinal Vein Occlusion," Stahl Dec., Exh. O, is cited solely for its general discussion of the retinal vein cannulation procedure, not as a source for the specific steps identified in the Article that make up the procedure when it is performed by the steady hand robot. *See* Stahl Dec., Exh. A at IEEE_000507 ("As an example, retinal vein cannulation **[7]** (emphasis added) involves *positioning* and *orienting* of a needle to the vicinity of the vein, *inserting* it when appropriate until contact is made.").

62. [redacted] Stahl Decl. Ex. L; [redacted].

Defendant's Response: Admitted in part and denied in part. The retinal vein cannulation procedure is discussed in the referenced grant proposal in a manner that is consistent with what appears in the Article, including in the use of the same or similar words like "insertion," "alignment" and "puncture," even though not all of the same words are used. *Compare* Stahl Dec., Exh. I at KRAGIC_00000439-0003-04 *with* Stahl Dec., Exh. A at IEEE_000510.

63. There is no source for the IEEE Article's RVC task decomposition or RVC task graph other than Dr. Kumar's Thesis. Stahl Decl. Ex. N 93:1-14.

Defendant's Response: Denied. *See* Ewing Opp. Dec., Exh. B (Hager Tr.) at 229-30; [redacted]; Hannaford Dec., ¶¶ 11-19, Exhs. B-E.

64. The IEEE Article copies the Thesis' task graph. Nineteen of the 22 descriptive elements are identical, and share all the attributes needed to deem them "strikingly similar" in this field. The few differences are cosmetic and superficial. Kumar Decl. Ex. A at 70; Stahl Decl. Ex. A, Figure 1; Salisbury Decl. ¶¶ 27-30; *id.* Ex. N 82:24-84:15.

Defendant's Response: Denied. *See* Ewing Opp. Dec., Exh. B (Hager Tr.) at 229-30; [redacted]; Hannaford Dec., ¶¶ 20-29; IEEE Additional Facts, ¶ 3, *infra*.

65. [redacted].

Defendant's Response: Admitted. [redacted].

66. Dr. Hager finds the similarities between the two task graph figures "apparent" and "troublesome." Stahl Decl. Ex. S; *id.* Ex. P 115:9-116:6; *id.* 122:6.

Defendant's Response: Admitted to the extent that Hager used the words "apparent" and "troublesome" to describe the resemblance between the two Figures, but Hager also stated that Figure 1 of the Article was "clearly different" from Figure 5.13 of the Thesis and that any similarities were superficial. Ewing Opp. Dec., Exh. B (Hager Tr.) at 120-22.

67. IEEE's expert witness attempted to locate another example of a task graph depiction of RVC, and failed to find a single one. The ***only*** such task graph is the one Dr. Kumar created and the IEEE Article copied. Stahl Decl. Ex. N 53:3-17; 93:1-14; *id.* Ex. Q 91.

Defendant's Response: Admitted in part and denied in part. IEEE admits the allegations contained in the first sentence of this Paragraph, but this fact is hardly surprising, since there is no evidence any other robotics laboratory was working or has ever worked on retinal vein cannulation. Ewing Opp. Dec., Exh. B (Hager Tr.) at 66-67; Ewing Mov. Dec., Exh. U (Kumar Tr.) at 49. IEEE denies the second sentence of this Paragraph. *See* IEEE's Responses to Paragraphs 12, 17, *supra*, and IEEE Additional Facts, ¶ 3, *infra*; *see also* IEEE 56.1 Response, ¶¶ 25-42.

68. Kragic and Hager later used the same task graph (IEEE Article Figure 1) in works they co-authored with other collaborators. The publishers of these later works have all issued statements or errata noting Kumar should have been acknowledged in connection with the task graph. Kumar Decl. ¶ 18 & Ex. E, F.

Defendant's Response: Admitted in part and denied in part. IEEE admits the allegations contained in the first sentence of this Paragraph and that other

publishers have issued statements or errata with respect to these other articles, but denies that "Kumar should have been acknowledged in connection with the task graph." Further, agreements Kumar reached with other publishers in settlement of actual or contemplated litigation are inadmissible under Fed. R. Evid. 402, 403 and 408, and IEEE objects to the Court's consideration of all evidence concerning such settlements on this motion. *See McHann v. Firestone Tire and Rubber Co.*, 713 F.2d 161, 166 (5th Cir. 1983) (". . . nor can plaintiff show the defendant's liability or extent of liability, by proof of defendant's settlement with a third person"); *Trout v. Milton S. Hershey Medical Center*, 572 F.Supp.2d 591, 596-600 (M.D. Pa. 2008).

69. Section IV of the IEEE Article ("Basic Primitives") contains routines and primitives taken entirely from the Thesis. The framework, task elements and terminology that the Article uses to express these instructions are all lifted from the Thesis. Kumar Decl. Ex. A chapters 4, 5 and pp. 96-97; Stahl Decl. Ex. A § IV; Salisbury Decl. ¶ 32.

Defendant's Response: Denied. *See* Ewing Opp. Dec., Exh. B (Hager Tr.) at 227-29; Hannaford Dec., ¶¶ 20-29; *see also* IEEE Additional Facts, ¶ 3, *infra*, Response to Paragraphs 12, 17, *supra.*

70. The article copies, practically *verbatim*, the Thesis' description of the steady hand robot hardware. Kumar Decl. Ex. A at 22-23; Stahl Decl. Ex. A § III (last full paragraph).

Defendant's Response: Denied. While one sentence in the Article describing certain attributes of the hardware of the steady hand robot is similar to a sentence

in the Thesis describing the same attributes, which is hardly surprising given the subject matter, the remainder of the hardware descriptions are notably different. *Compare* Kumar Dec., Exh. A at RK-IEEE000281-82 *with* Stahl Dec., Exh. A at IEEE_000507-08. Further, the same degree of similarity is found when the same passage in the Article co-authored by Hager, Stahl Dec., Exh. A at IEEE_000507-08, is compared with the unpublished manuscript co-authored by Hager that he gave to Kragic before her arrival at JHU. Stahl Dec., Exh. E at 4, Section III(A) at paragraph 2.

71. The two works describe their objectives in similar terms: the Thesis' goal is to "augment human actions in medicine" where "precision, efficiency, and consistency" are required; the IEEE Article's goal is "augmenting surgical manipulation tasks" which are "repetitive, sequential and consist of simple steps." Stahl Decl. Ex. A (Abstract); Kumar Decl. Ex. A at 9.

Defendant's Response: Denied. The expression in the two cited excerpts is obviously different, beyond the concept of augmenting surgical procedures through the aid of robots, a concept that is neither protectable nor original to Kumar. Taylor Dec., ¶¶ 2-3, Exh. A at IEEE_001538, 1542-43 (1997 CISST ERC grant proposal with sections devoted to "Surgical Augmentation Systems"), Exh. B at cover page (Title of 1998 JHU grant proposal listed as "Cooperative Steady-Hand Augmentation of Human Skill in Micromanipulation Task").

72. The Thesis and IEEE Article use the same expressive content to describe the robot's software architecture: "A modular architecture was designed

for controlling the steady hand robot. This architecture is suitable for several other surgical robot applications[.]" Kumar Decl. Ex. A. at 20. "The system has to be modular – complex tasks should be defined using a set of basic control primitives. This allows the surgeon to model a variety of tasks using the existing architecture." Stahl Decl. Ex. A, § I.

Defendant's Response: Denied, beyond the common reference to a "modular" software architecture, which is a common term widely used in the field of robotics. Ewing Opp. Dec., Exh. B (Hager Tr.) at 75-76; *see also* IEEE 56.1 Statement, ¶¶ 37-39.

73. The two works use nearly identical terms to describe the software controls used to manipulate the robot. The Article discusses the robot "as a purely kinematic Cartesian device," with specific inputs for controlling the tool tip position and velocity. Stahl Decl. Ex. A § IV.A. The Thesis likewise explains that "for moving to a specified frame, Cartesian control simply involves performing inverse kinematics on the given frame and moving with obtained joint parameters." Kumar Decl. Ex. A at 29; *id.* at 25-27 (discussing kinematic parameters).

Defendant's Response: Denied, beyond the common references to the steady hand robot as having "Cartesian" controls and "kinematic" properties, which are common concepts in robotics and terms that are necessary to use when describing attributes of the steady hand robot. Ewing Opp. Dec., Exh. B (Hager Tr.) at 38-40; Salisbury Dec., ¶ 8 (describing an article Salisbury published in 1980 called "Active Stiffness Control of a Manipulator in Cartesian Coordinates"); *see also* IEEE 56.1 Statement, ¶¶ 43-46.

74. Dr. Kumar was not aware of the IEEE Article's publication in 2003. It was published without his knowledge or permission. Kumar Decl. ¶ 15.

Defendant's Response: Admitted. No such permission was required.

75. Dr. Kumar returned to JHU in 2007 as an assistant research professor, working on research unrelated to his Thesis topics. He discovered the IEEE Article in 2010, while preparing a grant application to the National Science Foundation for JHU. He had no prior knowledge of its existence. Kumar Decl. ¶15.

Defendant's Response: Denied. At a minimum, on two occasions in 2009, Kumar was listed as a co-principal investigator on grant applications submitted to the National Science Foundation by Hager in which the Article was one of the cited references. Ewing Opp. Dec., Exh. E at IEEE_001380, 1402 (Ref. 60), Exh. F at IEEE_001428, 1454 (Ref. 71).

76. Dr. Kumar recognized immediately that the IEEE Article was based on his Thesis. Kumar Decl. ¶16.

Defendant's Response: Denied. As set forth in IEEE's Response to Paragraph 75, *supra*, Kumar had to be aware of the Article no later than 2009, but he did not complain to IEEE until January 2012, as set forth in IEEE's Response to Paragraph 80, *infra*. As set forth in IEEE's Responses to Paragraphs 35-40, 43-44, 46, *supra*, and in Paragraph 3 of IEEE's Additional Facts, *infra*, the Article was not based on Kumar's Thesis.

77. Because the IEEE Article was co-authored by a JHU colleague (Dr. Hager, by then chair of the Computer Science Department), he attempted first to have his concerns resolved internally. Kumar Decl. ¶ 16.

Defendant's Response: Admitted. However, Kumar's "concerns" with JHU encompassed a number of other issues beyond the Article co-authored by Hager. Ewing Opp. Dec., Exh. G. IEEE objects to the Court's consideration on this motion or at trial of Kumar's disputes with JHU, its review of his complaints that JHU characterized as "research or professional misconduct," and the outcome of his subsequent lawsuit against JHU as being irrelevant to any of the matters this Court must decide in this copyright infringement dispute. *See* Fed. R. Evid. 402.

78. A JHU dean conducted a summary inquiry into Dr. Kumar's allegations, construing them as a claim of research misconduct. While JHU found no violations of the university's research misconduct policies, the inquiry did not consider the issue of copyright infringement. Stahl Decl. Ex. CC at RK-IEEE000904; *id.* Ex. BB 77:11-21.

Defendant's Response: Admitted. *See* IEEE's objection incorporated into its Response to Paragraph 77, *supra*.

79. JHU later wrongfully retaliated against Dr. Kumar's employment for his pursuit of the complaint. Kumar Decl. ¶ 19 & Ex. G.

Defendant's Response: IEEE admits that a jury in Baltimore found JHU liable in the amount of $10,000 for retaliating against Kumar for filing a complaint of research misconduct that encompassed issues other than the Article co-authored by

Hager. Kumar Dec., Exh. G; Ewing Opp. Dec., Exh. G. *See* IEEE's objection incorporated into its Response to Paragraph 77, *supra.*

80. Dr. Kumar also alerted IEEE of his concerns with the IEEE Article. Stahl Decl. Ex. T 62:14-24.

Defendant's Response: Admitted. As stated in the deposition excerpt cited in this Paragraph, Kumar transmitted a plagiarism complaint to IEEE in January 2012.

81. IEEE admits its initial investigation of Dr. Kumar's complaint violated IEEE's own written policies, because it assigned the investigation to a single IEEE officer rather than a required independent, "ad hoc" committee of experts. That officer had clear conflicts of interest: [redacted], and he had advised a grad student who had preceded Dr. Kragic at JHU and had co-authored articles with Dr. Hager. Stahl Decl. Ex. T 52:18-53:13; 74:18-75:21; [redacted]; Kumar Decl. ¶ 20 & Ex. H.

Defendant's Response: Admitted in part and denied in part. IEEE admits that, initially, the investigation of Kumar's plagiarism complaint was assigned to Dr. Alessandro DeLuca, the then-Vice President of Publications at the IEEE Robotics and Automation Society (not IEEE itself). Ewing Opp. Dec., Exh. H (Vengraitis Tr.) at 51-54. Consistent with IEEE policy, DeLuca should have appointed an independent, *ad hoc* committee to review Kumar's plagiarism complaint that would report to him, *id.* at 52, but he failed to do so and instead summarily dismissed the complaint. Vengraitis Opp. Dec., ¶ 4; Ewing Opp. Dec., Exh. H (Vengraitis Tr.) at 73-74. When Kumar complained about this dismissal, DeLuca

did appoint the aforementioned *ad hoc* committee in a manner compliant with IEEE policy. [redacted]; Exhs. A[redacted]. [redacted], and, in any event, DeLuca did not participate in the *ad hoc* committee's deliberations and instead allowed each member to arrive at their own conclusions. Vengraitis Dec., ¶ 4.

82. [redacted].

Defendant's Response: Admitted. [redacted].

83. [redacted].

Defendant's Response: Admitted. As stated above, the quality of the Article is irrelevant to the issue of copyright infringement. *See* Response to Paragraph 47, *supra*. In addition, this same committee member also concluded that:

[redacted]

. . .

[redacted]

84. [redacted]

Defendant's Response: Admitted. [redacted]

85. [redacted]

Defendant's Response: Admitted.

86. [redacted].

Defendant's Response: Admitted. [redacted].

87. IEEE copied and distributed the IEEE Article, which remains available for distribution. Copies have been purchased from IEEE both before and after this litigation began. Stahl Decl. Ex. Y 47:15-21.

Defendant's Response: Admitted.

DEFENDANT'S STATEMENT OF ADDITIONAL MATERIAL, UNDISPUTED FACTS

IEEE hereby submits the following statement of additional material, undisputed facts that the Court should consider in opposition to Kumar's motion

for summary judgment. The entire contents of the IEEE 56.1 Statement [Dkt. 74] are hereby incorporated by reference, and the following additional material undisputed facts are offered for the Court's consideration.

1. [redacted]; Ewing Dec., Exh. C.

2. Prior to 2001, when the Thesis was published, Hager had served as an Assistant and Associate Research Professor at Yale University and a full Professor at JHU, beginning in 1999. He had also published, alone or with co-authors, 14 journal articles, 4 book chapters, 8 invited articles, and 47 peer-reviewed conference papers before that time, among many other professional accomplishments. Ewing Opp. Dec., Exh. I.

3. While Figure 5.13 of the Thesis and Figure 1 of the Article share similarities attributable to the fact that they concern the same research, performed on the same robot, in the same lab, there are material differences between them, namely:

A. Figure 5.13 depicts transitions from the "Insert" and "Contact" states to the "Retract" state, whereas Figure 1 of the Article depicts transitions to an "Error" state from all other states.

B. "Start" is depicted as a state in Figure 1 of the Article but as a transition in Figure 5.13 of the Thesis.

C. "Contact" is a state and a transition in Figure 5.13 of the Thesis, but only a state in Figure 1 of the Article.

D. In Figure 5.13 of the Thesis, a button must be pressed to puncture the vein, whereas in Figure 1 of the Article, no button is pressed to reach the "Puncture" state. Ewing Opp. Dec., Exh. A (Taylor Tr.) at 116-17, 122-25; Exh. B (Hager Tr.) at 45-61, 83-85, 156-57; [redacted]; Hannaford Dec., ¶¶ 20-29; Stahl Dec., [redacted]; Exh. X at RK-IEEE000861. *See* also Responses to Paragraphs 35-40, 43-44, 46, *supra*.

4. The Thesis generally is concerned with very specific applications and is more detailed than the Article, which focuses on more general principles and their application in XML language. Ewing Dec., Exh. B (Hager Tr.) at 69-73, 221-22.

Dated: April 6, 2015

Respectfully Submitted,

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